Evidence-Based Decision Making in Youth Mental Health Prevention

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Given the impressive amount of knowledge relevant to prevention efforts, this paper articulates strategies to capitalize on such knowledge through evidence-based decision making. Knowledge, or "evidence," is understood here as coming from multiple sources, including research, individual people, group history, and relevant theory. The presented strategies to facilitate evidence-based decision making are: (1) intervention knowledge management; (2) collaborative design; (3) knowledge resources for intervention; and (4) developmentally sensitive training and supervision. Examples and benefits are outlined for each strategy. It is ultimately argued that evidence-based decision making embodies the scientific approach, and is worth consideration within primary prevention, given its early success in secondary intervention of youth mental health.

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Introduction

To effectively promote global health, many decisions must be made about how to optimally design, implement, and evaluate interventions. These decisions should not be made at random or based on intuition alone, but rather practitioners are trained and strive to make informed actions based on knowledge. This paper defines "knowledge" as meaningful information that is derived from evidence—be that collected by research, individual experiences, history, or otherwise—and can thus be useful in evidence-based decision making.[1] Fortunately, prevention research and the efforts of individuals have generated a wealth of knowledge and resources relevant to the health of youth, families, and communities. However, using knowledge to inform decision making remains a daunting task, given that knowledge is vast, ever growing, and variable across sources.

Therefore, rather than merely adding to the growing body of existing knowledge, progress in primary prevention may now also be a matter of more efficient application of knowledge. To this end, evidence-based decision making should be championed as part of the scientific approach, along with evidence-based production and discovery. Evidence-based decision making includes:

1. better capitalizing on knowledge and resources already available;
2. aggregating relevant information in a way that lends itself to useful evaluation;
3. incorporating knowledge from multiple sources (such as program outcomes, researchers, program facilitators, youth themselves, administrators, parents of youth, teachers, and others);
4. using knowledge to direct goals and actions with more certainty; and
5. revisiting and updating knowledge over time, to adjust actions and decisions accordingly.

What would it look like? Consider a physical exercise regimen. One can either select an existing program or shape a customized regimen from multiple sources. There are hundreds of programs, books, and gyms available, but the knowledge from these sources must be meaningfully sorted through prior to implementing daily exercise. Customer reviews of local fitness classes could help weigh the options. A primary care provider could recommend personalized adjustments. One can then make evidence-based decisions by creating a weekly exercise plan that organizes the optimum options (e.g., types of exercise, specific fitness classes) with relevant qualifiers (e.g., length of time, accommodation for personal injury). The effects of the physical exercise

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regimen can then be collaboratively monitored and assessed from multiple sources (e.g., youth, their family).

The physical exercise regimen exemplifies evidence-based decision making in theory, but enacting such evidence-based decision making requires a purposeful approach. In the past decade, more attention has been given to evidence-based approaches in public health.[2] The aim of this paper is to further such discourse and present some complementary strategies that have the potential to facilitate evidence-based decision making. Given the early success of these strategies in youth secondary intervention,[3] they may be similarly useful to primary prevention efforts at both the individual and group levels.

Intervention Research Knowledge Management

Ongoing proliferation of youth health promotion and prevention program research has provided more knowledge and more options, and thus, as an unfortunate side effect, more complexity in the selection process. Hundreds of youth and adolescent programs target sexual health, mental/emotional health, academic achievement, injury prevention, violence, disease, tobacco/substance use, physical exercise, or nutrition.[4–6] Depending on the characteristics and needs of an individual patient or intended population, different programs may be more or less appropriate. Because choosing among individual programs or research contributions is an increasingly complex and unwieldy task, systems can be—and have been—created to aggregate knowledge in a standardized way. Building such systems can be undertaken by individuals, as done with meta-analyses, or by organizations, as is the case with intervention databases or registries. Many systematic review models exist, and there are even models to help prioritize topics for systematic review, such as value of information analysis.[7]

Example: Distillation and Matching Model

Relative to many traditional knowledge synthesis approaches (e.g., meta-analysis, literature reviews), the distillation and matching model (DMM)[8] is unique in that it allows for knowledge to be organized into "practice elements" common across intervention research. Practice elements refer to specific intervention strategies intended to shape adaptive competencies and response patterns (e.g., psychoeducation, support networking). Practice elements in combination with other intervention features and dimensions (e.g., coordination rules, underlying theory, implementation methods) can comprise full prevention programs. Looking across the entire service literature, DMM identifies practice elements—the "distillation" —and establishes their frequency in aggregate across successful programs. Then, DMM yields profiles or clusters that reflect which practices occur more frequently within programs for certain problems (e.g., substance use), youth features (e.g., age, ethnicity), or combined characteristics—the "matching." DMM has been used to analyze the child and adolescent mental health treatments literature and, recently, the adolescent prevention program evidence base.[9]

Benefits to Evidence-Based Decision Making

Systematically organizing knowledge from existing prevention literature serves as an analytic tool, which can usefully inform design of a new program, selection of an existing program, or adaptation of an existing program. As a result, one can use knowledge above and beyond the specific products that prevention program trials have produced. For instance, LifeSkills Training[10] is a school-based program for substance use prevention that has demonstrated effects in randomized trials, as published in 32 peer-reviewed publications.[11] According to the Model Programs Guide, there are 66 youth substance use prevention programs with "effective" or "promising" ratings.[12] Thus, applying a strategy to aggregate evidence across the 66 programs would capitalize on a significantly larger evidence base without forfeiting the ability to select and apply any one of those programs. One could still select one of the youth substance use prevention programs that best fits an intended population or has more empirical support according to a selected definition (e.g., most randomized trials, better functioning outcomes[13]). Alternatively, one could apply the DMM and design a new program that uses the most frequently occurring practice elements across the programs that demonstrated empirical support.

As prevention needs become more specific in target and population, there may be no existing empirically tested program that meets specific needs. When faced with this dilemma, one may be forced either to:

1. ignore the poor match and deliver an existing prevention program anyway; or
2. abandon the structured plan and come up with an unstructured approach based on what is known about the target problem or population, but probably based less on what is known in the services literature.[3]

Analyzing organized practice knowledge from the prevention program literature can help one overcome such dilemmas. A recent analysis examined how many youths in a service population have empirically supported psychosocial treatment options from randomized

trials that included youth participants with the same problem, age, and gender. When practice elements were specified as the unit of analysis, as opposed to full treatment programs, evidence-informed treatment options covered 11%–22% of youth that did not match with a formal evidence-based program.[14] This increase in youth treatment coverage resulted from the fact that the knowledge base—all studies that produced useable knowledge—is larger than (and actually a superset of) the evidence base of specifically defined intervention products.

Collaborative Design

Collaborative design brings relevant individuals together and facilitates their informed and goal-directed action. Effective collaborative design ideally outlines the various entities (literature bases, resources, individuals, organizations) and allows their mutual contribution to decisions and actions in line with their agreed prevention goals. Collaborative design need not have equal involvement of every individual, nor integrate all of their perspectives, as sometimes "less is more" for efficient decision making. An ideal infrastructure would allow access for all participants to interact and contribute to the system relative to their capacities and competencies. Ultimately, collaborative design should:

1. incorporate the existing research evidence base;
2. be sensitive to feedback and knowledge from different knowledge sources;
3. allow for evolving expertise of diverse system participants; and
4. support outcomes selection and monitoring throughout an organization.

Example: Interdisciplinary Teams

Research knowledge relevant to prevention efforts does not only come from research on prevention efforts. Consider the prevention target of stress management for adolescents. A review of service literature on existing adolescent prevention programs found that of programs targeting anxiety/stress management, 13% used a self-monitoring procedure.[9] Reliance on these findings alone may leave one with some uncertainty about the usefulness of self-monitoring. Incorporating knowledge from other areas of research can help address this uncertainty. For example, developmental research has found adolescents to have difficulty with self-assessment of stress,[15] suggesting adolescents could indeed benefit from self-monitoring practices. If research or an intervention planning team includes individuals from multiple disciplines, then the burden of knowing different literature bases is more manageable.

Example: People as Knowledge Sources

Individuals involved at the design level (e.g., researchers, preventionists), planning/implementation levels (e.g., program trainers, coordinators, administrators), and delivery levels (e.g., youth, teachers, doctors, parents) all need relevant and updated knowledge to make informed decisions. However, all participants within a system have different history and access to different knowledge bases. Providers and researchers are often more equipped to understand general knowledge about prevention–outcome relationships, whereas youth, family members, and community members are often better equipped with local (i.e., geographically or temporally) knowledge that can help address moderators of prevention efforts. Consider a high school depression prevention program that has reliably shown robust mental health effects, but over time the terminology has become outdated, rendering it less popular with students. In implementation decision making, the program and its general knowledge can be abandoned or it can be adapted based on local knowledge. In this case, a focus group of local high school students could recommend more relevant language. Local knowledge becomes more readily available when various stakeholders and community members are explicitly invited into planning committees, focus groups, or other collaboration efforts.

Benefits to Evidence-Based Decision Making

Collaborative design can more fully support decision making by fostering a knowledge-rich environment. A review of 81 youth and adolescent health promotion and prevention programs identified the following predictors of successful program implementation: shared vision (consensus of mission, staff buy-in), shared decision making (local input, community involvement), coordination with other agencies (partnerships, networking, multidisciplinary collaboration), communication, specification of task roles, managerial/supervisory/administrative support, training, and technical assistance.[16] Although the task of prioritizing certain information will remain, having a knowledge-rich environment will generally produce more evidence-based decisions compared with decisions made in an isolated environment. When addressing questions that are understudied in prevention research, relying on research from other fields or on local experts might provide some answers. Joining with interdisciplinary researchers, or at least reviewing findings, from youth secondary intervention, developmental

psychopathology, childhood development, or sociology may provide additional design, practice, or implementation principles. Coordinating knowledge within a prevention network of people can expand the epistemology to include not only what is already known from scientific research, but also what is already known by network insiders who understand their community's values and preferences.

By coordinating general knowledge with local knowledge, collaborative design can balance design-time/run-time control considerations when making intervention decisions.[3] Design-time control involves building an object or entity to have predetermined features and structure before its release into a given environment. Conversely, run-time control involves adaptation of an object or entity in response to its environment. In navigation, an example design-time control platform is a paper map—geographic knowledge is built into it before it is given to the user. If the user visits a new region or needs updated geographic information, then a different map must be purchased. By contrast, modern global positioning system (GPS) technology relies on design-time controls (e.g., stored maps) but also uses run-time controls to help navigate by prioritizing relevant local information (e.g., user's current location) and adapting to evolving information (e.g., traffic conditions). A prevention "map" might be a standardized school-based nutrition program with prescribed guidelines based on general nutrition knowledge. A more GPS-like procedure could be achieved by explicitly involving school nurses trained to adapt meal plans based on local knowledge of dietary restrictions, obesity concerns, or eating disorders. Although maps will always be needed, "prevention GPS systems" should be built to coordinate general knowledge with local knowledge to deal with updates and exceptions in real time.

Knowledge Resources for Intervention

Knowledge resources can be understood as tools or products that deliver knowledge through a specified structure. A prevention program manual is a knowledge resource for providers to facilitate behavior that has been empirically supported in a clinical trial. An e-mail Listserv is a knowledge resource to solicit relevant updates, questions, and answers from local and general knowledge bases. Ideally, all relevant entities (e.g., developers, providers, consumers) can access and interact with a given knowledge resource in order to bidirectionally input relevant knowledge. Instead of merely prescribing predetermined action paths, good knowledge resources should guide decision making by including information such as suggested clinical practices, health outcome evaluation, benchmarks, goals, and options to address barriers or change in course.

Example Strategy: Clinical Dashboards

Clinical dashboards are tools that display information in a succinct, organized, and informative manner, just as the dashboard of a car displays mileage, speed, and indicator lights.[17] Integrating knowledge from multiple sources and participants, clinical dashboards visually represent progress, current status, and projected outcomes. In secondary intervention, a clinical dashboard is applied to an individual youth patient and presents case context, outcome progress (e.g., measure scores), and practice/process history (e.g., practice elements such as psychoeducation) on a single interface. A dashboard becomes useful for decision making when a collaborator enters metrics such as consumer outcome scores, outcome benchmarks, and indicated practices or processes. Table 1 lists various hypothetical dashboards.

Individual-Level Clinical Dashboards

At an individual level, clinical decision making for a youth case patient could be supported by dashboards that are accessible and editable by primary care providers, prevention program coordinators, health professionals, and even youths' families. Process metrics might include medications, previous services received, and history of involvement with school prevention programs; corresponding process benchmarks could visually represent expected successful practice elements (e.g., those highlighted in a hospital's annual review report) or best process events (e.g., service plan ordering from published guidelines). Outcome metrics might include observed events or assessments with youth, families, or providers and corresponding benchmarks might present mandated progress rates, researched clinical cut off scores, or expected rates of change.[19] Together, process and outcome metrics can inform actions in real time (e.g., metabolic indicators can inform use of atypical antipsychotics; occurrence of a family stressor can signal need for heightened assessment or intervention).

The eIBD smartphone app for inflammatory bowel diseases is an existing example of a potentially scalable knowledge resource that incorporates many clinical dashboard principles.[20] By connecting a provider portal to the patient-facing mobile interface, the app measures patient health metrics, reports these metrics against provider benchmarks, and directs care delivery accordingly (e.g., low symptoms prompt client self-delivered health education; high symptoms direct patient to schedule appointment with provider).

Table 1. Knowledge Resource Examples: Hypothetical Dashboards

Prevention system activity	Example of dashboard use
Delivery of population-level prevention efforts	A school would like to implement a violence prevention program. Program coordinators collaborate with administrators to plan delivery and monitoring with a dashboard. The school administrators can outline a previous anti-bullying campaign run at the school, and the program coordinators can accordingly propose the indicated practice elements that have not yet been covered. Program coordinators might advise that outcome metrics should track externalizing behavior. School administrators, knowing that the more disruptive students are less compliant in completing paperwork, suggest that the school could instead track incident rates of fights per quarter.
Health provider training	Training coordinators request provider dashboards from hospital administrators before holding a training workshop on child obesity prevention. Administrators additionally provide the trainers with the hospital's patient satisfaction surveys, which they believe will further inform the trainers about these providers. The trainers are familiar with research showing that providers often achieve high patient satisfaction through certain common strategies, including active listening. They review provider dashboards and decide that all providers with excellent patient satisfaction or who attended a past related workshop should not need to attend the active listening portion of the workshop.
Organizational supervision of individual health care providers	Supervision of hand washing in hospitals is universally applied to all doctors in a six sigma approach.[18] All doctors must be supervised according to them same standards on an annual basis. Currently, metrics are collaboratively entered by assessors posted in clinics and by patient report. This system could be made more developmentally sensitive by using provider dashboards to inform supervision. If a provider has passed the set benchmark for X number of years, they could be allowed less frequent assessment. As a result, cost of supervision procedures might decrease. If patient feedback indicates a lapse in doctor behavior, then it should be indicated that the provider re-enters annual hand-washing supervision.

Group-Level Clinical Dashboards

Dashboards can also be extended into health promotion efforts at a population level. Prevention efforts can be guided by community dashboards that track outcome and process metrics, averaged across the target population. Within an organization or school, dashboards could track process metrics such as previously implemented programming and outcome metrics like incident rates, or even total cost of health promotion efforts across time. One working example of group-level knowledge resource use is when schools or campuses collect data on student behaviors, attitudes, and symptoms and then disseminate and present the results to multiple interested audiences. Such group-level knowledge resources could benefit further by integrating dashboard principles, such as benchmarks and recommended practices. Emerging technologic resources, such as Apple's ResearchKit (researchkit.org), will make widescale implementation of dashboard-like tools increasingly feasible.

Benefits to Evidence-Based Decision Making

Translating existing knowledge into usable prevention knowledge resources, such clinical dashboards or other health summary tools can more efficiently convey information relevant to problem identification, progress monitoring, and course of interventions. The Health Information Technology for Economic and Clinical Health Act has encouraged the "meaningful use" of electronic health records to guide providers' decisions in order to achieve patient improvements.[21] Qualitative data from hospitals suggest that summary care records do indeed improve quality of care or clinician confidence, even when minimal patient information is provided.[22] Further improved decision making could result from incorporation of patient-reported elements (e.g., health behaviors such as exercise, psychosocial issues such as distress) into health summaries of electronic health records.[23] Such knowledge resources also likely reduce the risk of implementing contraindicated practices or repeated implementation of unsuccessful interventions.

Developmentally Sensitive Training and Supervision

Developmentally sensitive training and supervision will be important for prevention efforts to accommodate varying levels of professional and paraprofessional (e.g., community leaders, peers) expertise. Beyond guiding decisions around delivery of prevention efforts, knowledge resources can also play a role in the training and supervision domains of system activity.

Example Strategy: Modular Training and Trainee Dashboards

Training procedures for prevention programming could be more modular in design, rather than unidirectional

and standardized. Modular training programs would have training content packages that can be selected in different sets and learned in different orders, according to the user's needs—reflective of the distilled practice elements described earlier. Practice elements of training protocols might be assessment administration, strategies for engaging youth, education on intervention targets, and others. Each element might be more or less relevant to each individual in training. For example, a review of effective training programs might identify outcome monitoring as a frequent didactic practice element, but the review might also identify that a subset of trainings for more-seasoned clinicians produced successful training results without teaching outcome monitoring. Trainers could identify metrics on a trainee dashboard and excuse trainees from portions of training accordingly. Training components could also be revisited by individuals with performance errors or training absences.

Example Strategy: Dashboards for Supervision

Similar principles apply to management or supervision of prevention programs. "Preventionist dashboards" could summarize individuals' experience related to target populations, targeted outcomes, or practice elements. By focusing on individualized strengths and areas for growth, different standard learning pathways could outline recommended supervisory practices (e.g., goal setting, performance feedback) and exception management. Provider outcome metrics for these dashboards should be collaboratively selected in order to be informative (e.g., patient appointment attendance rates hold different meaning for providers of inner city clinics compared with providers of home-visiting services).

Benefits to Evidence-Based Decision Making

Flexible supervision and training procedures can enhance decision making around the professional development of individuals and organizations. Modular design in training and supervision models allows for providers, teachers, parents, and any other individual to receive the most relevant (and still evidence-based) guidance, customized to their specific needs and learning history (i.e., different knowledge baselines). Using knowledge resources, such as dashboards for training and supervision, has the potential to reduce redundancy while still advancing providers and interventionists.

Conclusions

The authors have proposed strategies with the purpose not to promote the "right" approaches but rather convey the importance of evidence-based decision making. Potential benefits of the various strategies have been outlined throughout, and overall such strategies are intended to use knowledge in order to make prevention efforts more relevant to, inclusive of, and effective for the youth and their community. Although these strategies and concepts have been discussed in the context of youth mental health—as this is the authors' area of expertise—their usefulness likely extends into other domains of health and across ages.

Of course, there are barriers to implementing these strategies, as is the case with any proposed new direction for a field. First, decisions are not made in an objective vacuum—even if made collaboratively—and therefore decisions are also subject to personal bias, politics, influence of public opinion, and many more issues. Second, adoption of these proposed strategies will require open-mindedness, effort, and willingness for change. Third, the ability of knowledge resources to meet the needs for decision making models is dependent on the creation of practical technology. Many of these barriers to systematic innovation have been outlined within and outside mental health contexts.[24,25] Fourth, the focus on evidence-based decision making has touched less on how the full implementation process might unfold. To this point, a hypothetical implementation example is presented in Table 2 to demonstrate how these clinical concepts might be researched and implemented in a prevention context. Regardless of potential limitations and barriers, given that such strategies have so far been effective in secondary intervention for youth mental health, these strategies and an evidence-based approach to decision making are worth consideration for prevention science and practice.

For inspired and unconvinced readers, we provide some suggested action items. The authors are not suggesting outright adoption of all strategies, but instead the hope is that more individuals will test them and determine how their decision making is impacted.

1. Use evidence bases in a practical manner by examining knowledge in aggregate. Read research reviews, use existing intervention databases, or undertake analytic reviews of literature that has not yet been aggregated but could be informative.
2. Make collaborative design an explicit part of planning. Invite relevant individuals and entities into your decision-making processes.
3. Use or create knowledge resources for intervention, training, and supervision. When knowledge resources are created, the ideal is for knowledge to be aggregated from multiple epistemologies, updated in real time, and relevant to the particular entity within the larger system.

Table 2. Hypothetical Implementation: Prevention of Internalizing Symptoms (e.g., Depression, Anxiety) in University Students

Example	Example questions	Example actions	Example considerations/ limitations
Intervention research knowledge management	What practice elements are common to programs that have effectively reduced internalizing symptoms in this population?	Identify research on programs used with university students and distill the practice elements (e.g., physical exercise, psychoeducation about symptom identification) across programs and examine their frequencies.	Inclusion and exclusion criteria must be selected to make the pool of articles manageable for a systematic review.
Collaborative design	Which practice elements should we select, based on the needs of this specific university?	Collaboratively build an intervention menu of practice elements. Discuss the campus needs and student preferences with administrators, student leaders, university healthcare providers, relevant researchers, etc.	The solutions are less clear when evidence sources (the research, individual people, etc.) point in different directions. The question here of "what to do" can be empirically tested in the next phase though.
Implementation and supervision	Do the various combinations or order of practice elements matter for effective implementation? How much supervision is needed for each peer coach?	Build a week-by-week program to be piloted on campus. The practice elements can be delivered in modules, via peer coaching, electronic communications, group skills workshops, etc. Conduct feasibility research to assess program enrollment, participation, engagement, and completion.	The design of the recruitment and the research itself will affect the validity of the feasibility research. Deciding how many peer coaches to train will need to consider size of population but also supervision capacity.
Evaluation through knowledge resources	Does the program effectively reduce internalizing symptoms?	Create dashboards that display a timeline and new data can be overlaid to show prevalence of student symptoms, use of campus treatment services, timing of program modules, and timing of other campus resources	It will be difficult to confirm what proportion of change is due to prevention programming. Student outcome data is often incomplete, so generalizability issues must be considered.
Revisit Phase 1 and repeat phases for program improvement	What have we learned? What (and from whom) have we yet to learn?		The cycling through phases has no clear endpoint, leading to perpetual future directions.

4. Be willing to revisit the decision-making process and understand it as a cycle of evaluation, revisiting knowledge sources, and revising actions.
5. Recognize times when decision making is constrained by current technologic capacities, and advocate for needed products.
6. For interested readers, related concepts and the rationale for such strategies in youth mental health treatment are outlined in more detail in a special issue of the *Journal of Clinical Child and Adolescent Psychology*.[3]

At its core, evidence-based decision making is a scientific approach to practice. "Evidence-based" has come to mean scientifically "proven" through research. However, science is not about knowing the right answer—science is about making informed hypotheses and then testing those hypotheses in hopes of reducing uncertainty. As much as experimental research and RCTs provide meaningful information, there is often uncertainty when deciding how to implement programming in the real world. When one faces such uncertainty, evidence-based decision making can use multiple knowledge sources to drive hypothesis testing. Then, as new knowledge is collected through collaboration and outcome monitoring, hypotheses and interventions can be revisited and improved. Thus, as the proliferation of knowledge continues, managing knowledge for the purpose of prevention decision making will be as important as the knowledge production itself. In closing, the authors invite individuals involved in primary and secondary medicine—scientists, practitioners, community members—to reflect on opportunities for evidence-based decision making in their own work as we move toward a shared vision of healthier communities.

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